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(Reaffirmed 1998)

Indian Standard

SAFETY REQUIREMENTS FOR THE USE, CARE AND PROTECTION OF ABRASIVE GRINDING WHEELS

PART 4 SAFETY GUARDS

(Second Revision)

Abrasives Sectional Committee, EDC 13; Grinding Wheels Subcommittee, EDC 13 : 1 [Ref : Doc : EDC 13 (4716)]

1. Scope — This part of the standard deals with the requirements of safety guards to be used while working with the abrasive grinding wheels.

2. General Requirements

2.1 All abrasive wheels shall be used only on machines provided with safety guards.

Exceptions — This requirement shall not apply to the following classes of wheels and conditions:

a) Wheels used for internal work while within the work being ground.

b) Mounted wheels, 50 mm and smaller in diameter used in portable operations.

c) Types 16, 17, 18, 18R and 19 cones and plugs, and threaded hole pot balls where the work offers protection or where the size does not exceed 75 mm in diameter and 125 mm long.

d) Metal centered diamond lapidary wheels either notched, segmented or continuous rim used with a coolant deflector, when operated at speeds up to 17·5 peripheral metres per second.

e) Type 1 wheels not larger than 50 mm in diameter and not more than 12·5 mm thick operating at peripheral speeds less than 9 peripheral metres per second when mounted on mandrels driven by portable drills.

f) Type 1 reinforced wheels not more than 75 mm in diameter and 6 mm in thickness, operating at peripheral speeds not exceeding 47·5 PMPS provided that safety glasses and face shield protection are worn.

g) Valve seat grinding wheels.

2.2 *Internal Grinding* — Very often operator gets involved in accident to his forearm while inspecting the part being ground with control rod. To avoid this, a mechanically operated guard to cover the wheel running, while not grinding, is to be provided.

Exception — Wheel used for internal work while within the work being ground.

Note — For additional forms of operator protection, *see* Appendix A.

Exceptions to the use of safety guards are based on the impossibility of using these classes of wheels with conventional guards in place. In these cases, the work often forms a guard and the mass of the wheel is small. Face protection is particularly important when using this class of wheels.

3. Guards for Portable Grinding

3.1 *Cup Wheels—Types 6 and 11* — Drawn steel guards for use with cup wheels (Types 6 and 11) are as shown in Fig. 1 and Table 1. Other guards that will ensure equal or greater protection are also acceptable.

Adopted 11 January 1988

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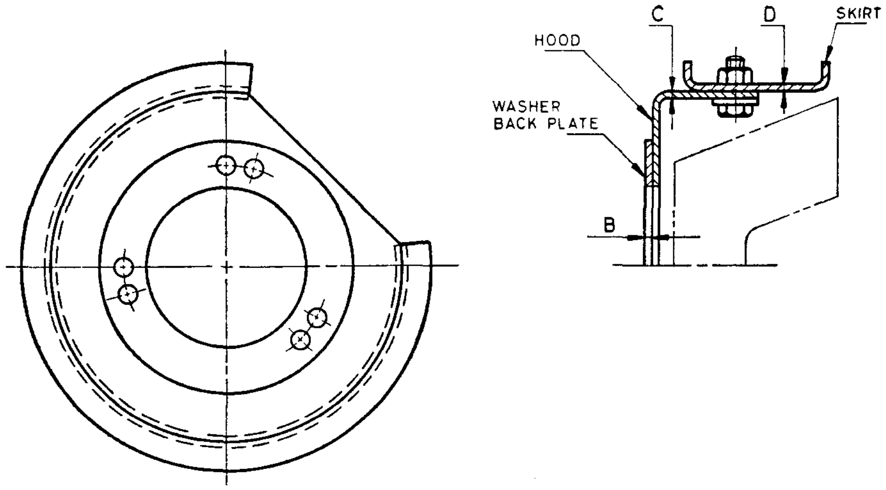

Cup wheels are available with either a threaded or unthreaded hole. Guards are available for **each of** these types. Figure 2 is one of the typical types.

FIG. 1 TYPICAL DRAWN STEEL GUARD FOR CUP WHEELS, TYPES 6 AND 11

TABLE 1 MATERIAL THICKNESS GUIDE FOR CONSTRUCTION OF DRAWN STEEL GUARDS FOR CUP WHEELS, TYPES 6 AND 11, OPERATING SPEED NOT TO EXCEED 47·5 PERIPHERAL METRES/SECOND

(*Clause* 3.1, and *Fig.* 1)

All dimensions in millimetres.

Wheel Diameter mm	Washer Back Plate Thickness *B*	Hood *C*	Skirt *D*
100	2·5	1·5	3
125	2·5	2·5	3
150	2·5	2·5	3

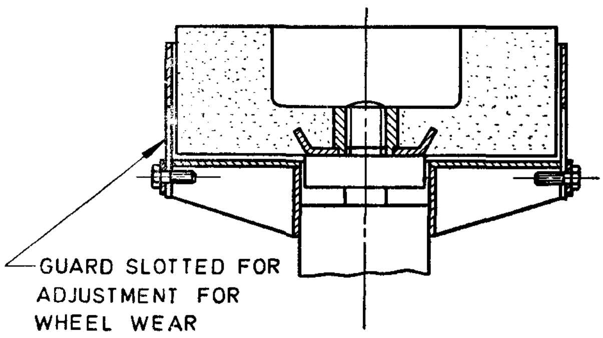

FIG. 2 CUP WHEEL SHOWING BAND TYPE GUARD

3.2 *Depressed Centre Wheels—Types 27 and 28* — Drawn steel guards for use with Types 27 and 28 abrasive wheels on portable machines are shown in Fig. 3 and Table 2B. An essential feature of the design is the inward formed lip on the outer edge of the guard. Dimension B shall be sufficient to ensure that the wheel is enclosed by the lip of the guard.

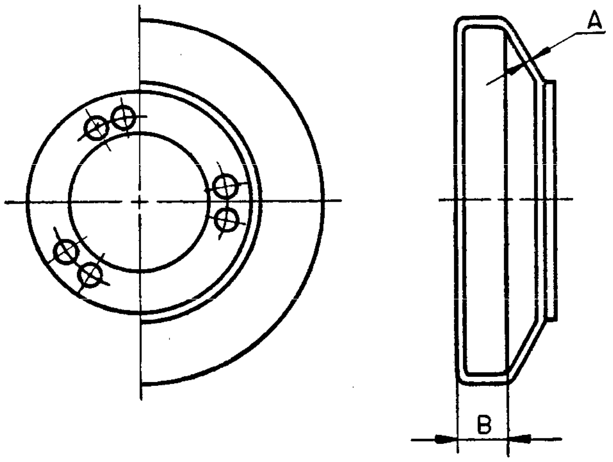

FIG. 3 PORTABLE GRINDERS, TYPES 27 AND 28 WHEEL

4. Guard Exposure Angles — The maximum exposure angles for the guards are specified in **4.1** to **4.10.** The angle of exposure shall be measured with the vertex at the centre of the spindle and extend to the guard periphery. The maximum exposure angles shall not be exceeded than specified.

Visors or other accessory equipment shall not be included as a part of the guard when measuring the guard opening, unless such equipment has strength equal to that of the guard.

Note — Maximum guard openings are based on the fact that the line of flight of broken wheel pieces will be tangential in the direction of rotation of the wheel.

Note that all exposure angles are measured from the centre of the machine spindle.

4.1 *Bench and Floor Stands* — The angular exposure of the abrasive wheel periphery and sides for safety guards used on machines known as bench and floor stands shall not exceed 90 degrees or one-fourth of the periphery. This exposure shall begin at a point not more than 65 degrees above the horizontal plane of the wheel spindle (*see* Fig. 4).

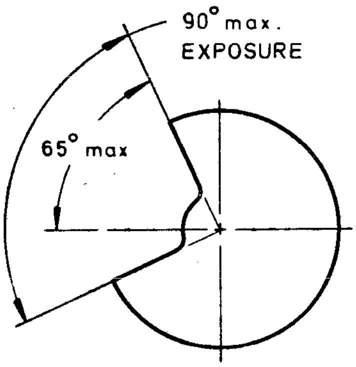

FIG. 4 EXPOSURE ANGLE FOR SAFETY GUARD ON BENCH AND FLOOR STAND

Exception — Wherever the nature of the work requires contact with the wheel below the horizontal plane of the spindle, the exposure shall not exceed 125 degrees (*see* Fig. 5).

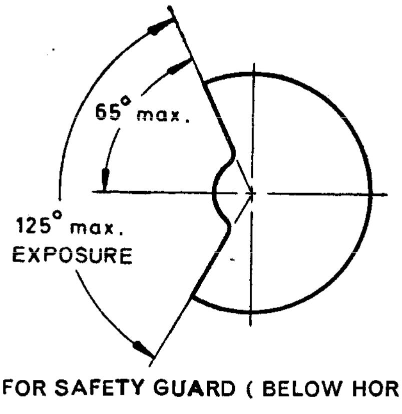

FIG. 5 EXPOSURE ANGLE FOR SAFETY GUARD (BELOW HORIZONTAL PLANE)

4.2 *Cylindrical Grinders* — The maximum angular exposure of the abrasive wheel periphery and sides for safety guards used on cylindrical grinding machines shall not exceed 180 degrees. This exposure shall begin at a point not more than 65 degrees above the horizontal plane of the wheel spindle (*see* Fig. 6).

4.3 *Surface Grinders* — The maximum angular exposure of the abrasive wheel periphery and sides for safety guards used on surface grinding machines where grinding is done on the wheel periphery shall not exceed 150 degrees. This exposure shall begin at a point not less than 15 degrees below the horizontal plane of the wheel spindle (*see* Fig. 7).

4.4 *Swing Frame Grinders and Cutting Off Machines* — The maximum angular exposure of the abrasive wheel periphery and sides for safety guards used on swing frame grinding machines and cutting off machines shall not exceed 180 degrees, and the top half of the wheel shall be enclosed at all times (*see* Fig. 8).

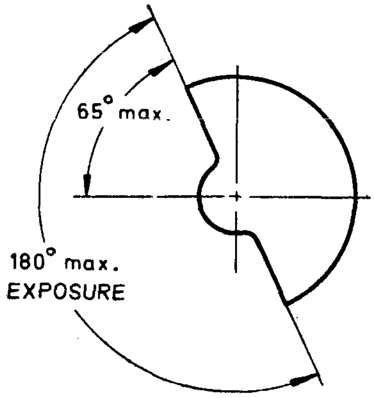

FIG. 6 EXPOSURE ANGLE FOR GUARDS ON CYLINDRICAL GRINDERS

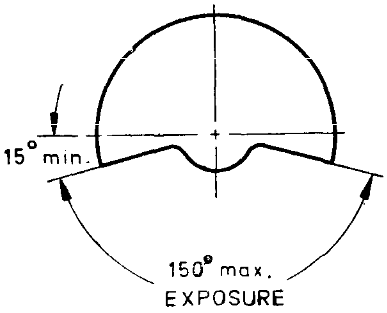

FIG. 7 EXPOSURE ANGLE FOR GUARDS ON SURFACE GRINDERS AND CUTTING-OFF MACHINES

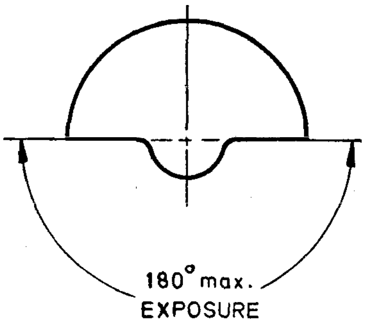

FIG. 8 EXPOSURE ANGLE FOR GUARDS ON SWING FRAME AND PORTABLE GRINDERS

4.5 *Automatic Snagging Machines* — The maximum angular exposure of the abrasive wheel periphery and sides for safety guards used on grinders known as automatic snagging machines shall not exceed 180 degrees and the top half of the wheel shall be enclosed at all times (*see* Fig. 9).

4.6 *Top Grinding* — Where the work is applied to the wheel above the horizontal centre line, the exposure of the abrasive wheel periphery shall be as small as possible and shall not exceed 60 degrees (*see* Fig. 10).

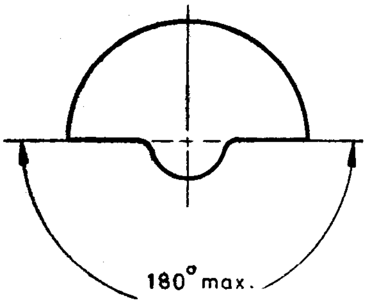

FIG. 9 EXPOSURE ANGLE FOR GUARDS ON AUTOMATIC SNAGGING MACHINE AND PORTABLE GRINDERS

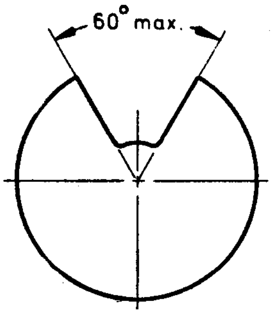

FIG. 10 EXPOSURE ANGLE FOR TOP GRINDERS

4.7 *Portable Grinders*

4.7.1 *Right angle head or vertical portable grinders for use with Types 27 and 28 wheels* — Safety guards used on machines known as right angle head or vertical portable grinders shall have a maximum exposure angle of 180 degrees. The guard shall be located so as to be between the operator and the wheel during use and adjusted so that pieces of an accidentally broken wheel will be deflected away from the operator (*see* Fig. 3).

4.7.2 *Portable grinders — Type 1 wheels* — The maximum angular exposure of the abrasive wheel periphery and sides for safety guards used on portable grinding machines using Type 1 wheels shall not exceed 180 degrees and the top half of the wheel shall be enclosed at all times (*see* Fig. 9).

4.7.3 *Portable grinders — Types 6 and 11 wheels* — A safety guard for vertical and angle grinders using Types 6 and 11 wheels shall cover the wheel's plane of rotation toward operator for at least 160 degrees. It shall cover the side of the wheel toward the driving flange for 180 degrees and shall have a skirt which is adjustable to the thickness of the abrasive wheel.

4.8 *Masonry Saws* — On machines specifically designed and used for masonry cutting, the maximum angular exposure of the cutting-off wheel periphery for safety guards shall not exceed 180 degrees (*see* Fig. 11 and 12).

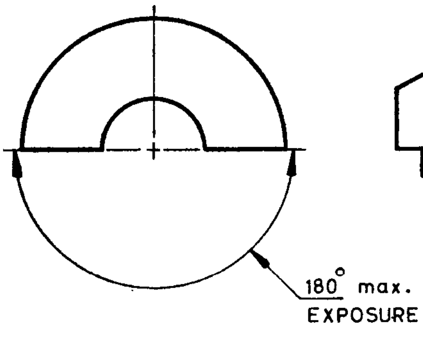

FIG. 11 EXPOSURE ANGLE MASONRY SAW

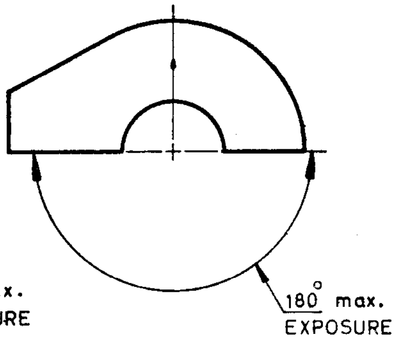

FIG. 12 EXPOSURE ANGLE MASONRY SAW

4.9 *Concrete Saws* — On machines specifically designed and used for concrete sawing, the maximum angular exposure of the cutting-off wheel periphery for safety guards shall not exceed 180 degrees (*see* Fig. 11 and 12).

4.10 *Rotary Tool (Burr) Grinding* — On machines designed and used for grinding steel or carbide rotary tools, the maximum angular exposure for safety guards shall not exceed 180 degrees. This exposure shall begin at a point not more than 65 degrees above the horizontal plane of the wheel spindle (*see* Fig. 6).

5. Exposure Adjustment — Safety guards of the types described in **4.1** and **4.2** where the operator stands in front of the opening, shall be constructed so that the maximum angular exposure above the horizontal plane of the wheel spindle shall never be exceeded. The distance between the wheel periphery and the adjustable tongue or the end of the peripheral member at the top of the guard opening shall never exceed 6 mm (*see* Fig. 13 to 15).

Exception — On bench grinders with wheels not greater than 125 mm in diameter operating at peripheral speeds less than 25 metres per second with rated outputs not greater than 1/10 hp, the 6 mm maximum clearance requirement shall only apply to the maximum diameter wheel for which the grinder is designed. The adjustable clearance requirements is not mandatory.

Figures 13 and 14 show two satisfactory methods of accomplishing exposure adjustment. These sketches are for purposes of illustration only. Other methods that agree with the basic rule are also acceptable. Figure 15 shows a condition that does not comply with the requirements.

Note — The exposure angle is always measured from the centre of the wheel spindle.

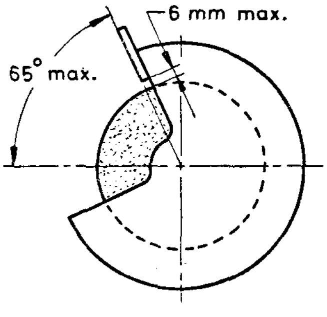

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FIG. 13 ADJUSTABLE TONGUE GIVING REQUIRED ANGULAR PROTECTION FOR ALL SIZES OF WHEEL USED

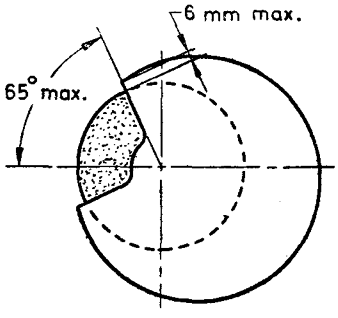

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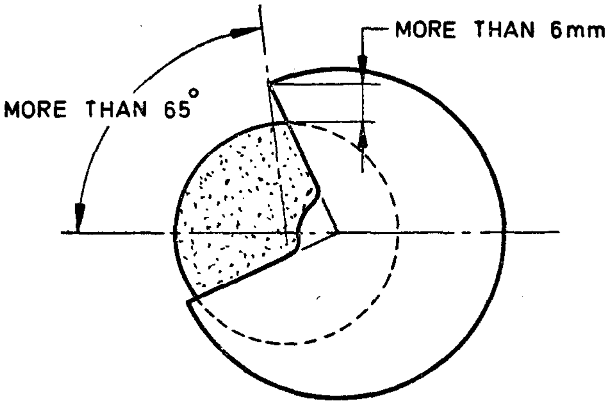
FIG. 14 MOVABLE HOOD WITH OPENING SMALL ENOUGH TO GIVE REQUIRED PROTECTION FQR SMALLEST SIZE WHEEL USED



INCORRECT

FIG. 15 MOVABLE HOOD WITH SIZE OF OPENING CORRECT FOR FULL SIZE WHEEL, BUT TOO LARGE FOR SMALL WHEELS

6. Enclosure Requirement

6.1 *Safety Guard* — The safety guard shall cover the spindle end and nut. The safety guard shall be mounted so as to maintain proper alignment with the wheel. The combined strength of the fastenings shall be adequate to maintain the guard in a safe position in the event of accidental wheel breakage.

Exception A — Safety guards on all operations, where the work provides protection to the operator, may be so constructed that the spindle end, nut and outer flange are exposed. Where the nature of the work is such as to entirely cover the side of the wheel, the side covers of the guard may be omitted.

Exception B — The spindle end, nut and outer flange may be exposed on machines designed as portable grinders, portable saws, masonry saws and concrete saws.

Exception C — On those wheels designed to grind on the rim face such as Type 6 and Type 11 and those designed to grind on the wheel side such as Type 27 and Type 28, an outer side cover is not required.

Exception D — On cutting-off machines equipped with a stationary guard, the spindle end and nut may be exposed at the bottom of the stroke, provided they do not extend axially beyond the wheel safety guard.

6.2 *Additional Enclosure* — The nature of many operations requires that adjacent personnel other than the operator be afforded protection.

Such protection should take the form of an enclosure which isolates the operation from the remaining working area.

Heavy wire screen, corrugated steel, steel sheet or other suitable material may be used in its construction.

6.3 *Openings in Wheel Safety Guards for Dressing* — When openings in the wheel safety guard assemblies are required for dressing, some means shall be provided to protect the operator and other personnel from the hazards of flying particles, sparks or wheel fragments.

Note — Acceptable means of protection can be the dressing device, its mounting or other guards or devices that provide protection to personnel.

7. Material Requirements and Minimum Dimensions

7.1 For minimum basic thickness of peripheral and side members for various type of safety guards and classes of service, reference may be made to Tables 2, 2A and 2B.

7.2 *Grey Iron Guards* — Grey iron guards shall not be used on machines with peripheral wheel speeds over 48 m/s.

7.3 *Malleable Iron Guards* — Malleable iron guards shall not be used on machines with peripheral wheel speeds over 45 m/s.

7.4 Cast steel guards may be used on machines with peripheral wheel speeds up to 45 m/s.

Structural steel guards may be used on machines with wheel speeds over 45 m/s and up to 80 m/s.

7.5 *Optional Materials* — If materials other than those listed in Table 2 are used, the thickness of the peripheral and side members shall be such that the resultant safety guard will be as strong or stronger than a similar guard constructed according to the appropriate table.

7.6 *Construction Guide for Fabricated Guards* — As a guide for the construction of fabricated guards of structural steel, Fig. 16 to 18 and Table 3 have been included.

The requirements given in Table 3 shall apply also to cast guards and in cases where the tongue is held by bolts, col 5 shall also apply.

7.6.1 *Strength of Connections* — Connections between the peripheral and side members or between parts of a fabricated guard shall have a strength in a radial direction at least equal to the strength of the members.

TABLE 2 RECOMMENDED MINIMUM THICKNESS OF PERIPHERAL AND SIDE MEMBERS OF GUARD FOR ABRASIVE WHEELS

(*Clauses* 7.1, 7.5 *and* 7.6.2)

A. For Speeds Not Exceeding 33 Peripheral Metres per Second

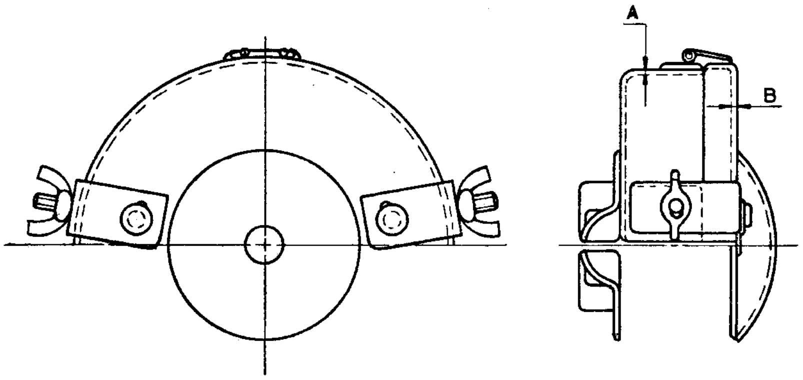
P. Material used in Construction of Guard	**Maximum Thickness of Wheel** mm	**Maximum Diameter of Wheel in Millimetres**															
		100		200		300		400		500		600		750		900	
		P	S	P	S	P	S	P	S	P	S	P	S	P	S	P	S
Malleable iron	50	3	8	10	10	10	10	—	—	—	—	—	—	—	—	—	—
Cast steel	50	6	6	6	6	6	6	10	10	13	11	16	13	20	16	22	20
	100	—	—	—	—	—	—	10	10	13	11	16	13	20	16	25	20
	150	—	—	—	—	—	—	—	—	—	—	—	—	22	20	28	20
Structural steel	50	3	2	5	3	5	3	6	5	6	6	8	6	10	8	13	10
	100	—	—	—	—	—	—	6	5	8	6	8	6	10	8	13	10
	150	—	—	—	—	—	—	—	—	—	—	—	—	11	8	16	10
B. For Speeds From 33 to 48 Peripheral Metres per Second																	
Structural steel	50	5	3	6	5	6	5	8	6	8	8	10	8	13	11	16	13
	100	—	—	—	—	—	—	8	6	8	8	10	8	13	11	16	13
	150	—	—	—	—	—	—	—	—	—	—	—	—	—	—	20	13
Cast steel	50	8	8	8	8	8	8	11	11	14	13	17	14	22	20	25	22
	100	—	—	—	—	—	—	11	11	14	13	17	14	22	20	28	22
	150	—	—	—	—	—	—	—	—	—	—	—	—	25	22	28	22

P = Peripheral S = Side

Note — Structural steel side plates with the middle parts cut away should be thicker than the dimensions given, unless otherwise adequate means of strengthening the guard are adopted. The thicknesses specified above are for wheels so mounted otherwise than between protection flanges. Where protection flanges are used, for example, in portable machines, a less heavy construction might suffice. A saving in weight might be obtained by the use of materials of a quality better than those listed above.

TABLE 2A GUIDE FOR CONSTRUCTION OF DRAWN STEEL GUARDS FOR WHEELS 50 mm THICK AND LESS, 250 mm AND LESS IN DIAMETER

(*Clause* 7.1)



For Speeds up to (Peripheral Metres per Second)	Maximum Thickness of Wheel mm	Wheel Diameter mm					
		50 to 125		Over 125 to 200		Over 200 to 250	
		A	*B*	*A*	*B*	*A*	*B*
25	50	1·5	1·5	2·5	1·5	2·5	1·5
47·5	50	1·5	1·5	2·5	1·5		
62·5	50	2·5	1·5	2·5	2·5		
85	25	2·5	1·5	3	2·5		

Note 1 — The recommendations listed in the above table are guides for the conditions stated. Other material, designs or dimensions affording equal or superior protection are also acceptable.

Note 2 — Material used in construction of guard my be sheet metal having minimum tensile strength 42 N/mm².

TABLE 2B GUIDE FOR CONSTRUCTION OF DRAWN STEEL GUARD FOR PORTABLE GRINDERS USED WITH TYPES 27 AND 28 WHEELS

(*Clauses* 3.2 *and* 7.1 *and Fig.* 3)

For Speeds up to (Peripheral Metres per Second)	Thickness of Wheel mm	Wheel Diameter mm	*A* mm	*B* mm
71	10 or less	75 to 225	1·5	12·5
55	Over 10 to 25	Up to 175	2·5	28

Note 1 — The recommendations listed in the above table are guides for the conditions stated. Other material, designs or dimensions affording equal or superior protection are also acceptable.

Note 2 — Material used in construction of guard may be sheet metal having minimum tensile strength 42 N/mm².

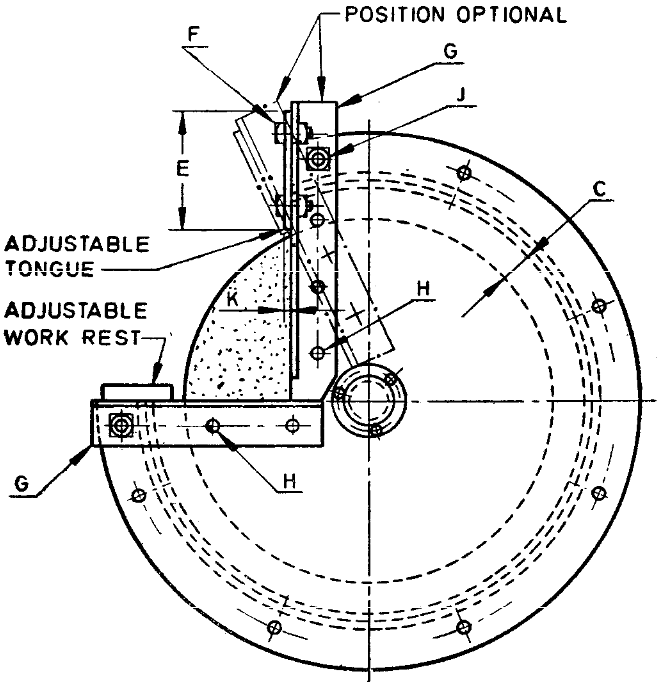


FIG. 16 TYPE A FABRICATED GUARD

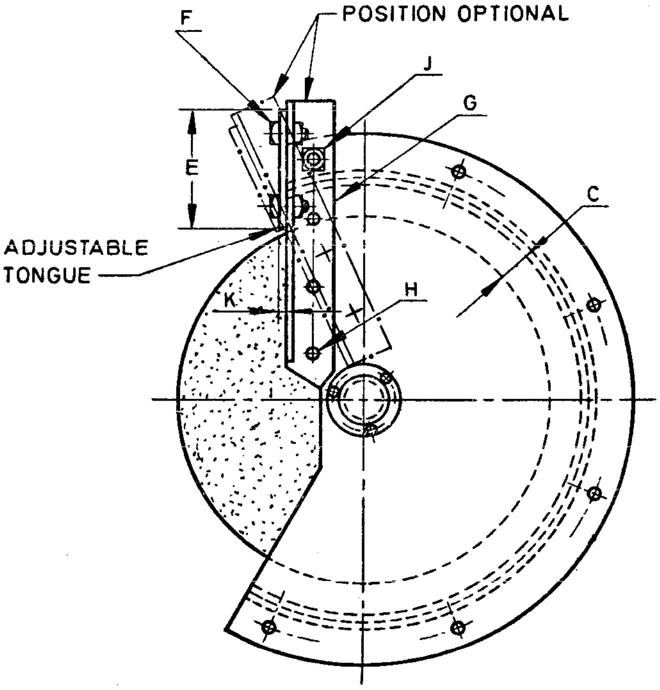


FIG. 17 TYPE B FABRICATED GUARD

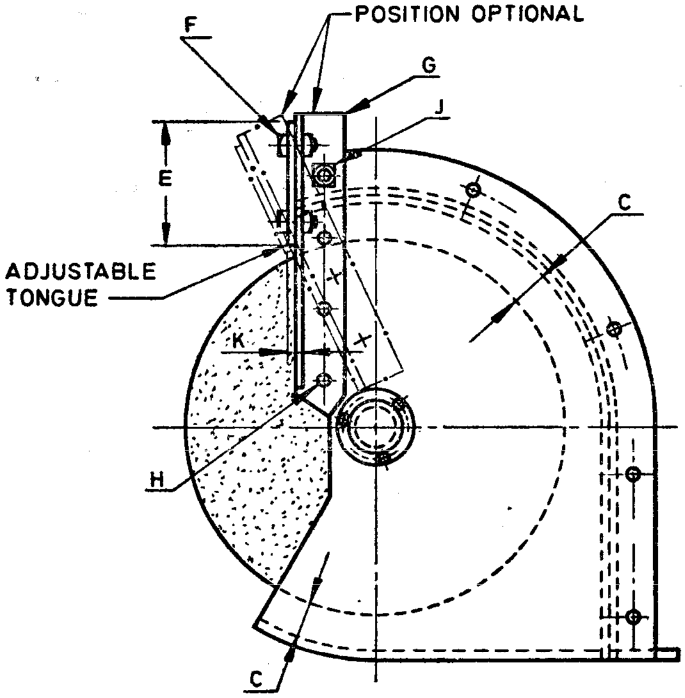


FIG. 18 TYPE C FABRICATED GUARD

TABLE 3 DIMENSIONAL REQUIREMENTS FOR CONSTRUCTION OF FABRICATED GUARDS

(*Clauses* 7.6 and Fig. 16, 17 *and* 18)

All dimensions in millimetres.

Diameter of Wheel	Maximum Space Between New Wheel and Guard at Periphery *C*	Maximum Inside Width of Guard	Length of Tongue *E*	Bolt Size of Tongue *F*
Under 300	38	38 wider than wheel	88	M12
300 to 400	38	50 wider than wheel	125	M16
425 to 600	38	50 wider than wheel	150	M16
Over 600	38	50 wider than wheel	175	M16

Diameter of Wheel	Size of Angle Supports for Tongue and Rest *G*	Diameter of Rivets for Supports *H*	End Connecting Bolts *J*	Thickness of Tongue *K*
Under 300	40 × 40 × 6	12	M12	6
300 to 400	50 × 50 × 6	14	M12	8
425 to 600	50 × 50 × 8	14	M16	13
Over 600	60 × 60 × 10	14	M16	13

7.6.2 *Optional Design* — Guard designs differing from those specified in this part but offering equal or greater protection may be used. Such design shall be proved by test.

Exception A — For cutting-off wheels of 400 mm diameter and smaller, and where speed does not exceed 80 PMPS, grey iron or malleable iron safety guards as specified in Table 2 or other safety guards providing equal or better protection may be used.

Exception B — For cutting-off wheels larger than 400 mm in diameter and where speed does not exceed 71 PMPS, fabricated safety guards as specified in Table 2 or other safety guards providing equal or better protection shall be used.

Exception C — For thread grinding wheels not exceeding 25 mm in thickness, grey iron or malleable iron safety guards as specified in Table 2 or other safety guards providing equal or better protection shall be used.

8. Material Specifications

8.1 The minimum thickness shown in Tables 1 and 2 are based on the following materials being used :

a) Malleable iron castings, conforming to IS : 2107-1977 'Specification for whiteheart malleable iron castings (*first revision*).

b) Steel castings, conforming to IS : 1030-1982 'Specification for carbon steel castings for general engineering purposes (*third revision*)'.

c) Structural steel plate conforming to IS : 226-1975 'Specification for structural steel (standard quality) (*fifth revision*); and

d) Grey iron casting, conforming to IS : 210-1978 'Specification for grey iron castings (*third revision*)'.

9. Specifications for Rivets, Bolts, Welds and Studs for Fabricated Guards — Table 4 may be used as a guide in determining the spacings and size of rivets, bolts and studs to provide satisfactory connections (*see* Fig. 19). Any means of fastening shall be considered satisfactory if, when assembled. It has strength at least equal to the tensile strength of the members being joined.

10. Band Type Guards for Stationary Grinding Machines — Band type guards shall conform to the following general requirements.

10.1 The bands shall be of steel plate or other material of equal or greater strength. They shall be continuous, the ends being either riveted, bolted or welded together in such a manner as to leave the inside free from projections.

10.2 The inside diameter of the band shall not be more than 25 mm larger than the largest rotating diameter of the wheel or its holder.

10.3 The band shall be of sufficient width and its position kept so adjusted that at no time wheel protrude beyond the edge of the band a distance greater than indicated in Table 5 nor the wall thickness (*W*), whichever of these dimensions is smaller.

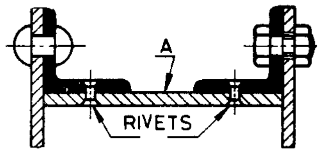
Exception — Band type guards used in conjunction with segments individually chucked in suitable holding mechanisms to form a grinding unit may have a door for access through the band to facilitate segment change and adjustment.

As a guide for the construction of band type guards, reference may be made to Fig. 20 and Table 6. Other designs affording equal or better protection are also acceptable.

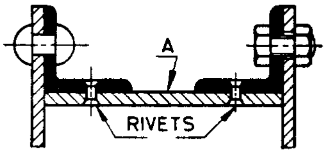
11. Mounting and Fastenings — Safety guards shall be so mounted as to maintain proper alignment with the wheels and the strength of the fastenings shall be equal to that of hood.

Note—Fastenings should be strong enough to hold the safety guards in place at all times and under all conditions.

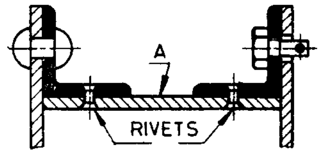
12. Provision for Exhaust of Dust — Safety guards on machines used for dry grinding and other operations, where dust is produced, shall have provision made for connection to an exhaust system.



SECTION SHOWING BOLT WELDED INTO ANGLE - COVER HELD BY NUTS ON ENDS OF BOLTS

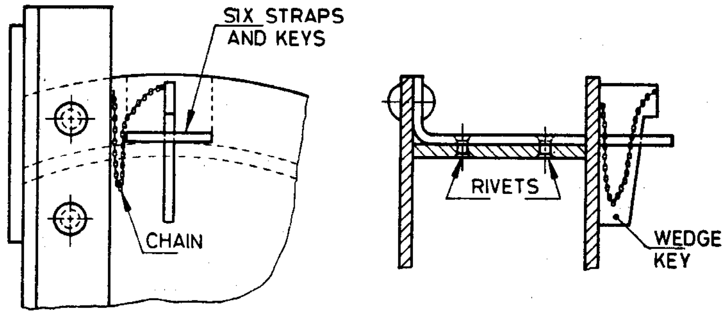


SECTION SHOWING BOLT THREADED INTO ANGLE ONLY - COVER HELD BY NUTS ON ENDS OF BOLTS

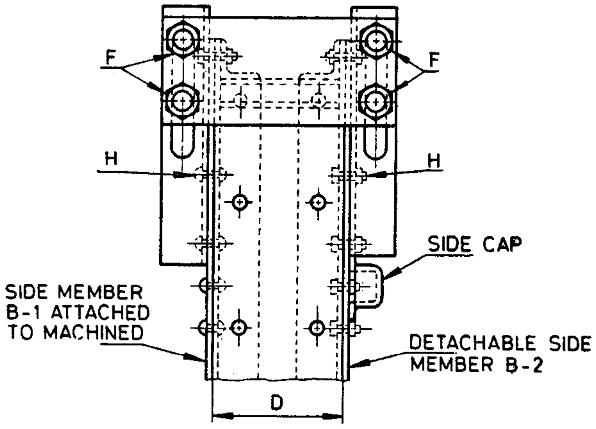


SECTION SHOWING STUD THREADED INTO ANGLE ONLY - COVER HELD BY PINS THROUGH ENDS OF STUDS

Note — Combined sectional area of angles to at least equal area of peripheral bond—A



SECTION AND SIDE VIEW SHOWING COVER HELD BY WEDGE KEYS THROUGH FLAT IRON STRAPS


F
F
H
H
SIDE CAP
SIDE MEMBER B-1 ATTACHED TO MACHINED
DETACHABLE SIDE MEMBER B-2
D

FRONT VIEW

Note — Combined sectional area of straps to at least equal twice the total area of bolts in other types

FIG. 19 GUIDE SHOWING CORRECT FASTENING PROCEDURE FOR SIDE MEMBERS FRONT VIEW, ALSO CROSS SECTIONS SHOWING FOUR SATISFACTORY METHODS OF SECURING COVER B2

(All these views apply to Types A, B and C guards)

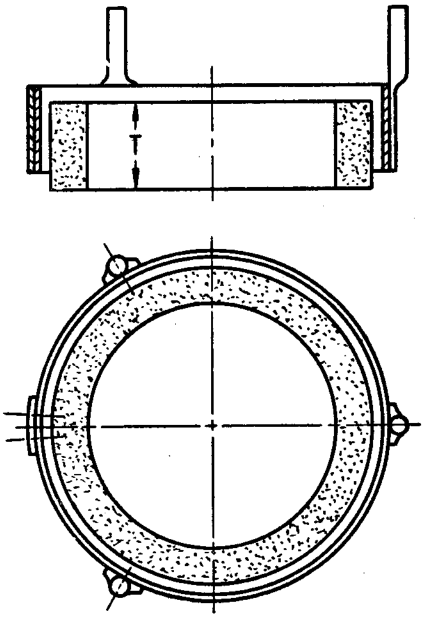


FIG. 20 BAND TYPFE SAETY GUARD

TABLE 4 MINIMUM SIZES AND SPACING OF RIVETS, BOLTS AND STUDS FOR CONNECTING PERIPHERAL AND SIDE MEMBERS IN FABRICATED GUARDS OF STEEL PLATE

(*Clause* 9 and *Fig.* 19)

All dimensions in millimetres.

Thickness of Steel Plates Being Connected	For Side Plates Attached to Machine		For Detachable Side Plate	
	Rivet Diameter	Maximum Distance Between Centres	Stud or Bolt Diameter	Maximum Distance Between Centres
3 and 1·5 5 and 1·5 5 and 3	7·5	75	11	150
5 and 5	7·5	75	11	150
6 and 3	10	100	14	200
6 and 5	10	90	14	175
6 and 6	10	75	14	150
7·5 and 5	14	100	20	200
7·5 and 6	14	100	20	200
10 and 6	14	100	20	200
10 and 7·5		90		175
11 and 6		75		150
11 and 7·5 13 and 7·5 13 and 10	14	75	20	150
15 and 10 17 and 11	15	75	20	150

TABLE 5 EXPOSURE OF WHEEL FOR BAND TYPE GUARD

(*Clause* 10.3 and Fig. 20)

All dimensions in millimetres.

Overall Thickness of Wheel, *l*	Maximum Exposure of Wheel
13	6
25	13
50	20
75	25
100	38
125 and over	50

TABLE 6 GUIDE FOR CONSTRUCTION OF BAND TYPE GUARDS

(*Clause* 10.3 and *Fig.* 20)

Minimum Material Specification	Dia of Wheel mm	Minimum Thickness of Band mm	Maximum Dia of Rivets mm	Maximum Distance Between Centres of Rivets mm
Cast or sheet steel (minimum tensile strength 138 MN/m^2) or hot rolled steel	Under 200	2	5	20
	200 to 600	3	6	25
	625 to 750	6	10	30

APPENDIX A

(*Clause* 2.2)

A-1. Introduction — While not part of this standard, the following relates to a number of factors which contribute to the safe operation of abrasive wheels. Safety is everyone's business.

A-2. General Requirements — Abrasive wheels should be used with operator safety in mind and in conjunction with the type of protective devices most effective for each application.

A-3. Classes of Protection Devices — There are two main classes of protection devices : those that protect the operator and those that provide protection to others in the work area.

A-3.1 *Operator Protection Devices*

A-3.1.1 *Safety guards* — The most positive way to protect the operator as well as others in the immediate area is by guarding the wheel effectively. The standard explains the provisions necessary for adequate guarding A guard protects the operator either by containing or deflecting the pieces of an accidentally broken wheel. Guards also control sparks and swarf.

A-3.1.2 *Safety goggles, spectacles and face shields* — Because the grinding operation produces sparks and swarf, eye protection is one of the most important factors. Safety goggles or safety spectacles must be worn at all times in the grinding area. Dust masks and face shields may be required as well.

A-3.1.3 *Protective clothing* — Safety aprons, gloves, safety shoes and other protective clothing should be worn as required by the nature of the grinding operation. Well designed protective clothing will allow the operator to work more efficiently and safely.

A-3.1.4 *Dust protection* — Dust masks may be required in an extremely dusty or contaminated environment.

A-3.2 *Work Area Proctection*

A-3.2.1 *Barriers* — In some operations, partitions, walls or separate grinding, booths will provide protection to other people nearby.

50	20
75	25
100	38
125 and over	50

EXPLANATORY NOTE

The safe operation of abrasive wheels requires the understanding and cooperation of many diverse groups and of all individuals concerned with their use or operation. This has been the basic viewpoint in establishing these safety requirements for the guidance of manufacturers, users and others involved in handling these products.

A thorough knowledge of nature and characteristics of abrasive wheels, the grinding machines on which they are used and the safety and protection devices which can and shall be used to limit, if not eliminate, injury or damage in case of accidental wheel breakage, is necessary for proper understanding of these safety requirements. These safety requirements may be used as a guide and not as an alternative to constant educational programmes at all levels which are the best insurance against those unforeseen conditions or circumstances which result in an industrial accident.

The mandatory requirements are printed in normal (10 points) type and the explanatory information in smaller (8 point) type. This is intended to facilitate a condensed document of mandatory requirements together with supporting tables and a figure. The explanatory information gives the basic reasons for the rules to encourage their implementation in practice. However, it may not be termed as part of the standard. The explanatory material has been included to encourage compliance and it is given only where it amplifies or clarifies a requirement.

Operating rules are not included in these safety requirements unless they are of such a nature as to be important safety requirements equal in importance to other requirements included in this standard. This standard was first published in 1962 and its first revision was taken up in 1973, based on ANSI B 7.1-1970.

In order to review the individual section at any time and also for technical and drafting reasons alike, this standard has been split up in the following ten parts:

Part 1 Scope and definitions
Part 2 Handling and storage
Part 3 General machine requirements
Part 4 Safety guards
Part 5 Flanges
Part 6 Inspection and mounting
Part 7 Standard speeds
Part 8 Special speeds
Part 9 General operating rules
Part 10 Mounted wheels

While splitting, this part (Part 5) of the standard has also been revised and the details have been made more explicit. More data has also been included.

All abrasive wheels are provided with one of the following forms of protection:

a) Safety guards, or
b) Protection flanges.

safetyguards have been covered in this part of the standard whereas the Protection flanges are covered in Part 4 of this standard.

While revising this standard, assistance has also been taken from the following publications:

'European safety requirement for the use, care and protection of abrasive wheels', issued by the Federation of European Producers of Abrasive Products (FEPA).

ANSI B 7.1-1970 'Safety requirement for the use, care and protection of abrasive wheels', issued by the American National Standards Institute, USA.

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